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THE AMERICAN JOURNAL OF PHARMACY

OCTOBER, 1917

SPECIFICITY OF DRUGS FOR PHOSPHATIDS.¹

By C. G. MACARTHUR AND G. D. CALDWELL.

The phosphatids are blamed for a great many physiological changes. Very often they are ascribed these special functions because certain other tissue constituents have been shown not to be involved, more often, however, because of their resemblances to ordinary fats. If one notes the complex and peculiar composition of the phosphatids it will be evident that it is not safe to rely too much on the physical resemblances to fats in an explanation of the physiological part the phosphatids play in the selective activities of the tissue cells.

In this investigation an attempt was made to see if there was any evidence that brain lecithin was involved in the specific action of brain drugs, and that heart drugs were not thus related to brain lecithin but were to heart lecithin. There is some evidence now that the two lecithins as prepared for this investigation are at least very similar in chemical constitution.² If the two are identical the drug specificity could not be attributed to their presence, but might be to a difference in amount or to a peculiarity in their position.

It is necessary to keep in mind the fact that there is not a very large amount of specificity in the drugs used for either of the tissues studied. In general there is only a difference in the degree of effect produced by a drug on the various tissues of the body. Then, too, it does not necessarily follow that because there is a certain pre-

¹ The importance of the work here reported was urged by the late Walde-mar Koch. He was largely instrumental in getting the investigation properly started. C. G. M.

² J. E. Darrah and C. G. MacArthur, *Jour. Am. Chem. Soc.*, 38, 922, 1916. C. G. MacArthur, F. G. Norbury and W. G. Karr, *Jour. Am. Chem. Soc.*, 39, 768, 1917,

dominant physiological effect this is the result of a correspondingly large chemical alteration. A small amount of a drug in one tissue may produce a much more noticeable pharmacological effect than a large quantity in another group of cells. Data is continually accumulating which shows that some chemical compounds, as, for instance, the hypnotics and anesthetics, are selected by the various tissues in approximate accordance with their lipin content.

The phosphatids of the brain may be concerned in the action of brain drugs in one or more of several ways: (1) There may be a more or less firm physical or chemical combination between the drug and the phosphatid in the cell itself. This might interfere with the normal respiration, as there is evidence for believing in the case of anesthetics. The phosphatids are very likely concerned in the metabolism of cell food, so the drug might affect this process. (2) The drug may enter into combination of some sort with the extremely complex associations of lipoids, proteins, salts, etc., that very probably exist in the cell. In this case the effects produced might be similar to those given above, but there might be no direct effect of drugs on the lipins themselves. (3) Whatever the nature of the limiting surface layer of the cell, the phosphatids in it, through solution of the drug, adsorption of it, or chemical combination with it, may bring about a specific transference of this particular drug to the interior of the cell and there cause disturbance in normal activity by affecting compounds probably other than phosphatids. If it is a question of solution-permeability, then one would expect that the specificity would depend very largely on the localization and quantity of the lipin and not so much on its chemical nature. (4) Or the phosphatids may interfere with the passage in and out through this surface layer of food or metabolized products. This might lead to a more or less general cell asphyxiation or cell starvation in the former case, while in the latter we would have so-called toxic effects, resulting from accumulations of end products which would cause retardation (depression) or increase (stimulation) of the rate of metabolism.

The same possibilities apply to the action of heart drugs on heart phosphatids.

It is rather difficult to understand just how a drug could produce changes in physico-chemical properties³ without altering to some extent the chemical nature of the substances present. It

³ Handowskay, *Biochem. Z.*, 25, 510, 1910.

would seem that those who have been finding a difference, say of surface tension, as the prime cause of the changes produced by drugs are getting only another measurement of what others measure by changes in the state of aggregation or amount of chemical compound or adsorption compound formed. Undoubtedly it would not be true to speak of any one of these changes as the cause or even as the predecessor of another, for probably they occur simultaneously.

If digitalis, strophanthin and other heart drugs show their specificity in action on the heart by some particular effect on heart lecithin or heart cuorin, they ought to produce consistent changes in the very sensitive calcium chloride precipitation limit of the phosphatid solutions, while caffein, cocaine, strychnine and other brain drugs should have either no effect on the heart phosphatid solutions or a different one from the heart drugs. Brain drugs, on the other hand, should produce similar consistent effects on brain phosphatids.

EXPERIMENTAL.

Varying amounts of a standard CaCl_2 solution ($M/100$, $M/50$ or $M/25$) are added to two series of test tubes. To each tube is added water enough to bring the amount to 5 Cc. A .2 per cent. or .3 per cent. phosphatid solution is made by continuous shaking of the required amount of phosphatid in water till homogeneous. An aliquot part is used for control experiments, while the rest is shaken with the drug to be tested. Five Cc. of the control solution is added to each of the series of tubes containing calcium chloride, while 5 Cc. of the drug solution is added to the tubes of the other series. The difference in the molecular amounts of calcium chloride necessary to precipitate the drug solution from that required for the control is a measure of the influence of the drug on the phosphatid. Readings are taken after twenty-four hours.⁴

Relation to Oxidation.—With new lecithin solutions the method is accurate to .1 Cc. of $M/100$ calcium chloride. The phosphatid solution slowly changes, thus making it necessary to run controls every day. This change seems to be related to the stage of oxidation of the preparation. The darker and older the phosphatid, the greater the amount of calcium chloride required to precipitate the lipid and as a rule the smaller the difference between the controls and the drug solutions. One sample of lecithin was originally pre-

⁴For more details of method, see W. Koch, *Jour. Pharm. and Exp. Ther.*, 2, 239, 1910.

cipitated in a .0048 molecular solution. A few days later the molecular concentration required was .0055. After a week it had risen to .0059 M. If the state of oxidation of the phosphatid is related to the nature or amount of combination between the phosphatid and the drug, one would expect that the presence of the drug would affect the rate of oxidation of the lipin.⁵ There seems to be but little doubt that one of the effects of those drugs which give evidence of combining with the phosphatids is to alter the auto-oxidation of the lipin.

Relation to Drugs.—In the following tables drugs in a dilution of 1/1000 were used instead of more concentrated solutions, because these small quantities seemed comparable with the amounts that might actually exist in a tissue when therapeutic amounts are given.

TABLE I.
Heart Lecithin A, 0.3 Per Cent.

	CaCl ₂ to ppt.	Control.	Diff. in CaCl ₂ .
1/1000 digitalis.....	.0110	.0044	+.0066
" strophanthin.....	.0057	.0044	+.0013
" veratrin.....	.0057	.0044	+.0013
" convallamarin.....	.0066	.0044	+.0022
" saponin.....	.0052	.0044	+.0008
" aconite.....	.0044	.0044	.0
" strychnine.....	.0044	.0044	.0
" caffeine.....	.0044	.0044	.0
" theobromine.....	.0044	.0044	.0
" chloral.....	.0044	.0044	.0
Ether 2 Cc. per 25 Cc. sol.....	.0044	.0044	.0
Chloroform 2 Cc. per 25 Cc. sol.....	.0040	.0044	-.0004

TABLE II.
Heart Lecithin B, 0.2 Per Cent.

	CaCl ₂ to ppt.	Control.	Diff. in CaCl ₂ .
1/1000 strophanthin.....	.0059	.0055	+.0004
" chloral hydrate.....	.0059	.0055	+.0004
" saponin.....	.0068	.0059	+.0009
" phlorhizin.....	.0068	.0059	+.0009
" nicotine.....	.0064	.0055	+.0009
" caffeine.....	.0048	.0048	.0
" urethane.....	.0055	.0055	.0
" strychnine.....	.0055	.0055	.0
" cocaine (HCl).....	.0055	.0055	.0
" morphine (SO ₄).....	.0064	.0055	+.0009
" atropine.....	.0066	.0048	+.0018

⁵ This question is being studied directly by adding drugs to phosphatid solutions and comparing the rate of oxidation with phosphatid controls.

TABLE III.
Brain Lecithin, 0.2 Per Cent.

	CaCl ₂ to ppt.	Control.	Diff. in CaCl ₂ .
1/1000 strophanthin.....	.0040	.0037	+ .0003
" chloral hydrate.....	.0042	.0037	+ .0005
" saponin.....	.0044	.0040	+ .0004
" nicotine.....	.0040	.0040	.0
" caffeine.....	.0040	.0040	.0
" urethane.....	.0037	.0037	.0
" strychnine.....	.0040	.0037	+ .0003
" cocaine (HCl).....	.0040	.0040	.0
" morphine (SO ₄).....	.0036	.0035	+ .0001
" atropine.....	.0050	.0040	+ .0010

It will be evident from Tables I and II that such heart drugs as digitalis and strophanthin, etc., do produce an effect on heart lecithin that brain drugs like caffeine do not. But in Table III it will be noted that heart drugs produce practically the same effects on brain lecithin. Therefore it seems reasonable to suppose that strophanthin and digitalis are active on phosphatids because of the chemical nature of the drugs. Very likely this action can be attributed to the fact that they are glucosides, because chemical substances such as phlorhizin and saponin, which are not heart drugs, produce very similar results with both brain and heart lecithins.

* At first one might conclude that the lecithins are in no way related to drug action. But in the cases where an effect on the precipitation limits of CaCl₂ is produced by a drug it seems necessary to assume that the lipins have at least a secondary importance. The results would indicate that the combination between the drugs and the lecithin is not the chief cause of the specific action. It is possible that the effect is largely oxidation, as noted above. But another possible way of explaining the relationship is to suppose that the location and quantity of the phosphatid determine whether the particular drug will enter the tissue cell or determine the amount that will enter. In this case the final drug effect would be determined by the non-phosphatid constituents or the associated complexes of the interior of the cell. Strychnine does give evidence of direct specificity for which it is difficult to account.

Different Salts of Drugs.—The following table records the differences in the precipitation limits found in the various salts of strychnine.

TABLE IV.
Heart Lecithin C, 0.3 Per Cent.

	CaCl ₂ to ppt.	Control.	Diff. in CaCl ₂ .
1/1000 strychnine (alk.).....	.0097	.0097	.0
" " nitrate .....	.0114	.0097	+ .0017
" " sulfate .....	.0114	.0097	+ .0017
" " acetate .....	.0123	.0097	+ .0026

Other alkaloids gave similar differences also. Of course, these differences must be due to the direct action of the negative radicle on the lipin. This data shows the necessity of working with the alkaloids themselves if comparable results are to be obtained. It indicates, too, that small amounts of impurities affect rather largely the results obtained. Some of the variations found in different preparations might be attributed to this cause. It might be said that the results obtained were due to impure drugs. Though the compounds used were not purified, they were the best obtainable on the market. One would not expect the consistent data obtained if these impurities were related so definitely to the results. In the organism, however, the different salts would not produce changes similar to those recorded above because the drug, no matter in what form it was administered, would arrive at the cell in the same form.

Concentration of Drugs.—It was desirable to know what was the effect of differing drug concentrations upon the lipins.

TABLE V.
Heart Lecithin, 0.3 Per Cent.

	CaCl ₂ in ppt.	Control.	Diff. in CaCl ₂ .
1/1000 strophanthin .....	.0052	.0044	+ .0008
1/2000 " .....	.0048	.0044	+ .0004
1/4000 " .....	.0046	.0044	+ .0002
1/8000 " .....	.0044	.0044	.0

With an increase in amount of drug the difference in amount of CaCl₂ necessary to precipitate the lecithin increased. This fact is consistent with the larger effects produced by increased amounts of drug and so would indicate that the lipins are concerned in the relation between drug concentration and amount of pharmacological effect produced.

Cuorin and Cephalin.—If brain lecithin and heart lecithin do

not account for direct specificity of drug action in the brain and heart, it might be that cephalin and cuorin would. Lecithin from the heart may be identical with brain lecithin but cuorin is not the same as cephalin.

Though they were repeatedly experimented with as above described for lecithin, they gave results which indicated that the drugs affected cuorin and cephalin much as they do the lecithins. There were no indications that specificity was due to them. However, because of the rather unsatisfactory end points the results with these two phosphatids are not very conclusive.

CONCLUSIONS.

1. Drugs do affect the auto-oxidation of lecithin. One of the ways in which some specificity may exist, then, is in the alteration in tissue oxidation.

2. Though certain compounds (principally the heart drugs) do combine with heart lecithin, there is no direct specificity, because they affect brain lecithin in the same way. This would indicate that the peculiar action of these drugs was due to an effect on the complexes in the cell itself, not on the phosphatid, but that the lipins in the surface layer of the tissue cells may determine the amounts of the drug that will enter.

3. The precipitation limits of calcium chloride on lecithin solutions are different when different salts of the drug are present. It is necessary, then, in a comparative study to use the free alkaloids.

4. The higher the drug concentration, the greater the amount of combination with the lecithin.

5. Heart cuorin and brain cephalin give no indication of being more related to specificity than the lecithin.

FROM THE BIOCHEMICAL LABORATORIES OF
THE UNIVERSITIES OF CHICAGO AND ILLINOIS.

THE WAR AND PHARMACY.¹

BY CURT P. WIMMER, A.M., PHAR.D.

On August 1, 1917, three years will have passed since the outbreak of what history, no doubt, will call the "world war." And, indeed, this term will be well-chosen, for the majority of the civilized nations of the world are now engaged in a life and death struggle, the likes of which the world has never seen before. War is the most serious business in which a nation can engage; a business in which tremendous sacrifices in life and property must be made and in which compensation for the investment is most uncertain, be the war aims ideals or provinces or indemnities.

Modern wars are not fought by armies alone but by the combined effort of the nation's entire population and resources. This again means that each and every business and profession must be profoundly affected in some way or other, and now that we have entered the great struggle and are, from all appearances, to play a leading and possibly deciding part, it is both timely and appropriate to devote a short time to a discussion of the influences which the war has had upon pharmacy up to the present time and is likely to have in the future.

And another question which we might well try to answer at the same time is: Is there not in this carnival of blood and devastation to be found a consoling element, a compensating factor, the proverbial silver lining of the cloud? Compared with the other nations at war we have felt, so far, little of the effect of war upon pharmacy. Should, however, the conflagration last for two or three more years, as some of our high officials say it will, we shall, no doubt, feel as much as European countries, at least as the group of Allies whom we have joined. Let us, therefore, make a brief survey of the condition of pharmacy in the European countries and deduce from that what may be in store for us.

Unquestionably, the difficulties of the pharmacists in the Central Powers are great and perplexing. A careful review of German and Austrian publications reveals the fact of the existence of considerable shortness of qualified assistants. Almost every other adver-

¹ Read at the annual meeting of the New Jersey Pharmaceutical Association, June, 1917.

tisement for help asks for lady pharmacists. It seems, then, that female help is being employed in German pharmacies on an unprecedented scale. In many stores the proprietor will manage to get along without any assistant whatsoever.

All chemicals of any use to the government have been seized. Pharmacists are permitted to have on hand certain fixed amounts only. This fact, together with the great difficulty of import, owing to the English blockade, explains the veritable flood of substitutes which we find recommended in the pharmaceutical press. We find substitutes for soaps, starch, rubber, honey, baking powder, coffee, cocoa, tea, pepper, oil, varnish, glycerin, eggs, jam, soups, butter, sugar, candies, glue and many others. Some of these substitutes, especially some of those offered under proprietary or trade names, have been found to be rank fakes. For example, a salad-oil substitute was upon analysis found to be a solution of gum in water, colored yellow with a coal-tar dye and having a food value of only 1/240 of that of oil.

Of particular interest to us are substitutes for necessary pharmaceuticals and I will mention a few of them.

In place of tincture of iodine, a 5 or 10 per cent. solution of tannic acid in 95 per cent. alcohol is recommended.

In order to save lard or edible fats, the following is recommended as a base for liniments and ointments:

Liquid Paraffin	460.00 Gm.
Olein	90.00 Gm.
Oil of Rape Seed	130.00 Gm.
Ammonia Water, duplex	150.00 Gm.
Lime Water	100.00 Gm.
Water	50.00 Gm.

Whoever has liquid vaseline on hand may use the following formula:

Liquid Vaseline	535.00 Gm.
Rape Seed Oil	100.00 Gm.
Olein	85.00 Gm.
Ammonia Water, duplex	135.00 Gm.
Lime Water	100.00 Gm.
Water	45.00 Gm.

Both preparations are claimed to be readily miscible with chloroform and could, therefore, be used as basis for chloroform liniment.

Another interesting preparation is the vegetable milk. Experiments with the milk-juice of the Soya bean, the walnut, hazel-nut and almond are claimed to have proven these milks fully as good as cow's milk. Indeed, they separate, upon standing, a cream which when used in tea, coffee or cocoa imparts the same taste as does cream of cow's milk.

Owing to the scarcity of soap, the following preparation is widely used: Quillaja bark, 100 Gm., is heated with 300 mls of water in a steam-bath for one half hour. Filter and when cool add kaolin 400 Gm. and talcum 400 Gm. Flavor with 10 gtt. of benzaldehyde.

The use of sodium perborate in washing powder is recommended.

Glycerin, of course, is no longer obtainable and a great many substitutes for it are offered. The most important of these are offered by Dr. P. E. Unna. According to him, glycerin substitutes must be differentiated as to the purpose for which the preparations are intended. They may be divided into four classes: (a) solution of salts; (b) solutions of sugar; (c) solutions of gums; (d) solutions of oils. A solution of iodine in glycerin to be used for painting ulcers and wounds is replaced by a solution of iodine in simple syrup. Glycerin as a softener for the skin is replaced by a mixture of equal parts of anhydrous eucerin and concentrated solution of calcium chloride. As laxative or enema, glycerin can be replaced (and it is claimed very effectively) by ordinary brown syrup mixed with two to four times its volume of milk.

To replace saltpeter in asthma remedies, they use sodium nitrate, potassium chlorate or sodium perborate. Liquid paraffin mixed with spermaceti replaces vaselin. *Rhamnus purshiana* is replaced by cortex frangulæ; oil of turpentine by benzol mixtures; tamarind by prune; starch in powders and pastes by talcum; tea by strawberry leaves; lycopodium by a colored starch, etc.

You can readily imagine what the troubles of the German or Austrian pharmacist must be! A constant search for "something just as good."

That the serious war-time has not yet killed the sense of humor of the Germans is evidenced by an answer to a proposal to declare two days a week as "medicine-less" days to save the supply of medicines. The answering correspondent of a pharmaceutical journal declares that it would be necessary in order to make medicine-less days effective to also declare "sickness-less" days. He also adds

that the impending shortness of cotton would no doubt require the institution of some "dress-less" days.

And now a few words about pharmacy in war times in some of the countries of the Allies. The war has brought to Russian pharmacists a realization of their dependence upon German products. This is shown by the formation of a number of new chemical and pharmaceutical societies created for the purpose of manufacturing pharmaceuticals formerly obtained from Germany. In this they have been quite successful and they are now manufacturing in Tomsk, for example, such preparations as xeroform, airol, anti-febrin, urotropine, etc. There is also a great movement on foot to cultivate medicinal plants, for example, the castor bean in Selgirka. Other parts of Russia claimed to be suitable for drug cultivation are Crimea, Turkestan and the Caucasus.

Of the belligerents which have been in the war for almost three years, the western group of the Allies, England and France, have been least affected, comparatively speaking. The importation of drugs into England especially has been well maintained. This explains the almost complete absence of formulæ for substitutes in the English and French publications. In the issues of the last two months there is, however, clear evidence that the war is pinching the English pharmacist. The Army Council of the English government has taken possession of all stocks on hand in a wholesale or retail business in excess of quinine sulfate, 100 oz., quinine bisulfate, 25 oz., quinine hydrochloride, 25 oz., phenacetin, 7 lbs., formaldehyde, 10 gallons.

Trading in seeds, oils and fats is being closely controlled and no dealing in these substances is allowed except upon permission of the Ministry of Munitions.

Glycerin is now no longer available for medicinal purposes and pharmacists are requesting physicians to prescribe glycerin substitutes. Glycerin also may no longer be used in the manufacture of soft gelatin capsules, except in a few specific cases, as apiol, creosote, guaiacol and a few others.

The use of rice, wheat or rye flour in toilet preparations is prohibited.

Another commodity, or better, necessity, which is now short is sugar. Physicians are requested to no longer prescribe syrups, and pharmacists are notifying their customers that preparations containing sugar will be no longer available. I cite you a letter of a

correspondent of the "Chemist and Druggist," March 10, 1917, as follows: "Must such preparations (referring to syrups) be ever thus presented? Would not a sour or bitter form suit just as well? There are more desirable flavours than sweet, though these are most pleasing to infants. But sour preparations would suit even better in many cases, and fermentation would be prevented. Would not a bitter suit the beer-drinker better? Would not an acid preparation suit the tart old maid or the still younger 'tart'? If sugar be wanting, and it is, it becomes more than your duty, your privilege, to lead the way in demonstrating the fact that sugar as an adjunct to drugs can and will be superseded by —. It might be announced thus: 'Owing to national scarcity of sugar, we beg to inform our clients that what were syrups in the sweet and piping times of peace have now become war sours and bitters! They have the same therapeutic medicinal value, the only difference being the exchange of a sour or bitter flavouring in place of the sugar or sweet.'"

The B. P. does not stand in the way of such necessary innovations. No syrups or sugar coating during the war, then none will be wanted after!

An interesting proposal is the use of malt extract in place of sugar. It was found after considerable experimentation that 1 gram of malt extract generally produces about 1 gram of sugar in a porridge or rice and milk pudding.

And now, in the light of war conditions abroad, what is likely to result here in the event of a prolonged war? In my opinion we will have to face the following:

1. The supply of assistants will be still shorter and less satisfactory than it is now. Many of our young pharmacists have already enlisted, more of them will be drafted. A considerable number of those not in the service will probably seek and find employment in other business ventures which are now more profitable than pharmacy.

2. The prices of certain chemicals and drugs will rise to higher levels than they are even now. Some chemicals, no doubt, will disappear almost entirely from the pharmaceutical market. Glycerin will probably be the first common substance to become scarce. Sugar, fats and oils will, no doubt, follow.

3. The volume of business done by the average pharmacist will probably increase, but the net income will not keep step with this

increase. In other words, it will be more expensive to do a certain amount of business than heretofore. Also let us remember the inevitable and heavy war taxes which will come along.

4. It is not at all impossible that a governing body will be created to control our business, say a "Ministry of Foods and Drugs," which will order what we may sell and what not, what prices we may charge, how much of a substance we may keep on hand, etc.

The picture of our immediate future is scarcely a pleasing one, but you know what Sherman said about war and the truth of this quotation will in the not very far distant future be brought to the realization of us all.

And yet, one can not fail to see the bright side of the picture. I find it in the tremendous impulse given by the war's necessities to pharmaceutical endeavor. The old proverb that necessity is the mother of invention is again proven true. While the large number of new remedies proposed are principally for army use, some will no doubt prove of great general value. Quite unexpected was the development of preparations of insecticidal value, especially for the louse. Lice have been found to be carriers of spotted fever and lice-killers are, therefore, of great importance. The Germans use a vinegar of savadilla, the French an ointment containing 10 per cent. of oil of stavesacre, the English have an N.T.C. mixture, composed of naphthalene 96 parts, creosote 2 parts, and iodoform 2 parts.

Numberless new methods and preparations for the cleansing and healing of wounds have been created by the war. I mention only the method proposed by Dr. Carrel of continuous irrigation with hypertonic saline solution, or of frequent dressings. A so-called "Bipp Paste" composed of

Bismuth Subnitrate	1.0
Iodoform	2.0
Liquid Paraffin	q.s.

is now claimed to give incomparably better results than the above method.

A new ointment tried out in the Royal Army Medical Corps has been found to be excellent for burns and cases of "trench-feet." Its composition is the following:

Resorcin	1 per cent.
(may be replaced by B-Naphthol $\frac{1}{4}$ per cent.)	
Oil of Eucalyptus	2 per cent.
Olive Oil	5 per cent.
Soft Paraffin	25 per cent.
Hard Paraffin	67 per cent.

Another preparation which no doubt will have permanent value is the Carrel-Dakin solution of the hypochlorites.

The intensive experiments in the cultivation of medicinal plants, the efforts of everyone to make himself independent of his neighbor, the efforts to avoid or utilize waste-products—all this must eventually rebound to the benefit of mankind.

There is no doubt in my mind that when our hour of trial comes, when medicines become scarce in amount and high in price, the inventive genius of the American pharmacist will assert itself and when the fray is over will proudly take its place among those who have contributed to the welfare of mankind.

RESEARCH IN PHARMACY COLLEGES¹

BY H. V. ARNY.

That the sum total of knowledge, which we delegates to the meetings of the American Conference of Pharmaceutical Faculties teach to our students, is the result of millions of experiments of thousands of experimenters is self-evident. No one of us who enjoys library work can but realize the enormous debt we owe to the research men of the past, be they patient plodders of little fame, or brilliant investigators whose names are almost household words. And how are we of the present generation of teachers paying this debt? Are we looking wise and doing nothing? Are we living up (or down, if you like) to the impertinent query on a modern post-card: "Do you ever spend anything besides the evening?" Or are we doing our bit; thus adding our trifle to the enormous mass of information inherited from our predecessors?

The study of the *Proceedings* of the American Pharmaceutical Association and of the pharmaceutical journals of the nineteenth

¹ Read before the American Conference of Pharmaceutical Faculties, August, 1917.

century makes the delver truly humble. Are we "doing our bit" as did Parrish and Proctor and Squibb and Rice and Maisch and Trimble, to say nothing of the many retail pharmacists of that day who suggested improvements of manipulation that they dug out of their routine practice? A truly interesting study would be an inquiry as to whether the decline of professional pharmacy is due to a decline in research work or whether the transition of pharmacy from an art to a mere bartering has stifled the research spirit, but that is not the object of the present paper.

What we of the Conference should discuss is the query: "Are we doing our bit?" A careful comparative study of current and past pharmaceutical literature leads me unwillingly to the conclusion that we of the colleges have not been doing our share of research; that too large a percentage of pharmaceutical research of the past decade has been done outside of our colleges. The pharmacopoeial work of Beringer, the retail pharmacist, the research work of the score or more chemists in pharmaceutical houses, the fine investigation of anæsthetics by Baskerville; the remarkable adsorption work of Lloyd, the painstaking study of alkaloidal separation done by Beal and Lewis in the chemistry department of the University of Illinois are types of work that should have been done in the laboratories of our pharmacy schools, and we of the faculties are the poorer for not holding up our end of the line with sufficient work of similar character.

But it is not the purpose of this paper to find fault. The facts, distasteful though they may be to some of us, are stated merely to ask why these conditions should obtain. Every one of us here knows why. Few of us are in a position to frankly state the reason. In fact, until his appointment by President Lyman upon the Committee on Research of this Conference, the writer hesitated to speak positively on the subject. But as he has reached the arbitrary line of demarcation between impetuous youth and conservative age, he feels he has the right to speak, not for himself, but for the benefit of those who come after him. He is one of the group who, a quarter of a century since, fitted himself for teaching in an atmosphere of research. Actually entering upon a teaching career, he found the three hindrances to research usual to most of our schools of pharmacy: (a) a mass of routine work apart from the regular hours of instruction; (b) a meagre income that had to be augmented from outside sources; (c) abundant opportunity to secure such profitable

work. This condition confronts almost every energetic teacher in a college of pharmacy. The more willing he is, the more administrative work is placed upon his shoulders; the more alert he is, the more opportunity there is to materially increase his income by outside work; and between these two grindstones, the original desire to do research work becomes extremely attenuated.

Again, as the teacher grows older and better known, a fourth factor hindering research comes into being: the constant interruptions, telephonic, social, pedagogic or administrative, that are a part of a busy man's day. In fact, if an older man is to do research work, there are but two ways in which he can accomplish his desire; he has either to become an unsocial recluse, or he has to have a helper to do the actual work under his directions. The latter plan is not entirely unfeasible; in fact, in the busiest years that the writer has had, he did his most prolific research work, since he had the income to pay a competent assistant to give his entire time to the problems at hand. Subordinates on the teaching staff are usually slender reeds upon which to lean as far as research work is concerned, since as a rule, under our present college methods, instructors have their hands more than full if they conscientiously carry out their routine duties.

Can the situation be remedied? To solve this problem our new Committee on Research has been appointed, and the writer does not wish to arrogate to himself the functions of that committee. To promote discussion, however, the following thoughts are suggested:

First. That it should be expected of each teacher that each year he publish some article reporting original research. The research need not be necessarily complex. The improvement of a pharmacopoeial formula is sometimes of more practical value than the untangling of a complex chemical formula.

Second. If college authorities demand this research, it is obvious that they should encourage such work rather than hinder it by placing greater and greater responsibility on willing shoulders.

Third. Research fellowships, either in pure or applied science, should be established at each college of pharmacy and these fellows should perform their investigations under the directions of the regular members of the faculty, who thus will have the opportunity of displaying originality as demanded in the first requirement given above.

Fourth. A systematic campaign should be inaugurated among

the philanthropic public, educating it to the importance of pharmaceutical research. The remarkable gifts made to medical research during the past decade show what a systematic campaign can do and of all of the immensely valuable fields of medicine, none is more important to the common weal than is the field of pharmaceutical research.

PHARMACOLOGIC SUPERSTITIONS.¹

BY HORATIO C. WOOD, JR., M.D., PHILADELPHIA.

THE TEST OF UTILITY.

There are a number of worthless therapeutic practices—some based on abandoned theories of pathology, some due to technical errors in pharmacologic investigations, some based on misinterpreted clinical observations, and some the mere relics of medieval superstition—which still persist in common use. Some of these receive even today the sanction of authority; men whose acumen in many lines has won our respect occasionally lend the weight of their recommendation to measures which can be defended on neither theoretical grounds nor clinical results. It has seemed to me that it might be worth while to call attention to the source of some of the more common superstitions of this character.

First, however, it is necessary to establish the criteria on which we base our judgment as to the therapeutic value of a drug. Certainly the length of time during which a drug has been employed in medicine furnishes no measure of its usefulness. Ammoniac gum was described by Dioscorides in the first century, and for more than a thousand years was highly esteemed, but has fallen into such disuse that it is no longer recognized by the U. S. Pharmacopeia. In studying the *materia medica* of the first, tenth and fifteenth centuries, one is struck by their similarity to each other and their difference from that of today. Remedies whose reputation was sustained unabated for 2,000 years have been unable to bear the light of modern knowledge, and within half a century have not only been completely discarded as worthless but their very names forgotten.

The first edition of the U. S. Pharmacopeia was published less than a century ago.² Of 624 drugs and preparations deemed by the

¹ Reprinted from the *Journ. Amer. Med. Assoc.*, Vol. LXVI, pp. 1067-1073.

² Dec. 15, 1820.

editors of that work to be "those, the utility of which is most fully established," 305 have been already despoiled of their official recognition. I have been surprised in looking over this interesting work, not so much, however, by the number of ancient remedies which we have ceased to use, but by the absence of drugs today universally recognized as our most valuable weapons against disease. Neither iodine nor any of the iodids are in the first American Pharmacopeia; one looks in vain for potassium bromid or any other preparation of bromine; there is no form of salicylic acid except the oil of gaultheria, and that apparently was recognized only for its aromatic odor; one finds neither chloral nor any of our modern somnifacients; coca and cocaine are both missing, as are also santonica and santonin; ether is recognized, but chloroform was unknown; nitroglycerin is not mentioned, the only form of nitrite recognized being sweet spirits of niter; the only mention of ergot is in the secondary list—that is, drugs of doubtful worth—where is listed *Secale cornutum* or spurred rye, but it was not deemed of sufficient importance to have any preparation recognized. One is not surprised at the absence of our modern coal tar derivatives, such as acetanilid and phenol (carbolic acid), but that the usefulness of aspidium or pilocarpus should not have been earlier discovered seems worthy of comment. In the place of these remedies which the present day physician relies on in such a host of conditions, we find horseradish, oatmeal, barley, stag's horn, metallic gold and silver, cowhage—whose sharp bristles were used as a vermifuge on the theory that they would stab the worm to death—and scores of remedies not even whose names would be known to many readers.

Are we to gage the utility of a therapeutic agent by the clinical results we think we see? Wendell Phillips said in one of his famous orations, "You read history not with your eyes but with your prejudices." The thought might well be applied to the medical profession. Practically all our experience is interpreted through the glasses of our prejudice. Never, since the days when the ancient Assyrian chanted his exorcisms of the pathogenic devil according to the phases of the moon, have men been able to free themselves in the choice of their remedies from the dominance of some theory concerning disease. Indeed, it cannot well be otherwise. The manifestations of disease are so protean, and its development subject to such an infinitude of variation, that no simple collection of observations without interpretation is of the slightest value. If those who believe

that empiricism should be the only guide in the treatment of the sick could read the history of medicine "with their eyes," they would see what a feeble flickering light to the progress of medical science experience has been; nay, it has been a veritable will-o'-the-wisp, leading men astray farther and farther from the truth. For fifteen centuries the experiences of medical Europe were interpreted to suit the theories of the great Galen, and in these fifteen hundred years, with their observations of millions of deaths, physicians learned absolutely nothing of how to relieve suffering or prolong life. A splendid illustration of the blindness of humanity to their surroundings is seen in the duration of the bloodletting superstition. For three centuries physicians with the best motives bled their patients to death, absolutely incapable of realizing that their venesection killed far more than it saved. Despite the frightful mortality of their methods of treatment, they clung to the error with the enthusiasm of a religious fanatic. Dr. Benjamin Rush on his death-bed, almost pulseless from the combined effects of disease and repeated venesections, begged the attending physicians to bleed him again. The story of the pneumonia "cures" is another interesting confirmation of the deceptiveness of experience. Time after time has some new method of treating this disease been brought forward with most impressive statistics which would seem to have established it as of the utmost value, and yet despite the venesection, veratrum, creosote, quinin, alcohol, camphor, ice jackets and poultices, the mortality of this disease is practically unaffected.

Of the drugs of generally recognized utility,³ numbering about 270, not one third of those introduced within the last hundred years were discovered through the medium of bedroom observations.

If neither antiquity nor clinical results can establish the therapeutic credentials, on what grounds are we to accept therapeutic claims? There are those who pretend to believe that the final judgment as to the therapeutic value of a drug can be made in the pharmacologic laboratory; such a claim, however, is so foolish as scarcely to be worthy of a refutation. Although it is undeniable that we owe most of our useful drugs to the researches of chemists or physiologists, their conclusions concerning the value of a remedy can be accepted only when confirmed by clinical experience. I do not know how many rabbits Ehrlich and his assistants cured with salvarsan, but I do know that he was unwilling to permit this drug

³ A Handbook of Useful Drugs, Chicago, 1913.

to be placed on the market until the conclusions of his laboratory were clinically tested in the hospital. Ehrlich felt the need of clinical confirmation in the claims for his new remedy, but it is extremely rare that laboratory workers are able to present such direct or definite evidence as to the value of a therapeutic agent.

We reach conclusions of therapeutic usefulness by a circuitous route: the pathologist tells first what he believes is the nature of the morbid disturbance, the pharmacologist explains how the drug seems to modify the bodily functions, the practitioner tries if the observation of the pharmacologist fits to that of the pathologist as one should expect. It is like a puzzle picture: the color and shape of one piece seems to indicate its juxtaposition to another; but only when they are actually fitted into each other can we be sure that they really do belong together. To change the simile, we build up a system of treatment on the foundation of pathologic hypothesis, using stones of pharmacologic experiments cemented together by deductive reasoning. The clinical imperfections of the structure may or may not be manifest at once. Only after the building has withstood many storms can we be sure of its stability. The weaknesses which develop may be due to the faults in the pathologic or pharmacologic building material, but above all to the weakness of our dialectic binding together.

Perhaps I can make my meaning clearer by concrete examples. The effects of certain drugs in relieving symptoms are so obvious that even the most casual observer can convince himself of their action. Antimony will produce emesis, or pilocarpin increase the secretion of sweat with such infallibility that even the prejudiced observer could not fail to connect cause and effect; but the question of whether the emetic action of antimony is beneficial in pneumonia, as the ancients believed, or whether the diaphoresis produced by pilocarpin is useful in uremia, as we believe, requires nicer discrimination and cannot be answered dogmatically. The commonly accepted theory of uremia is that the symptoms are caused by the retention of some poison in the system, and that by the use of eliminants we bring about the excretion of this poison through other channels. After all, however, it cannot be considered as proved that uremia is due to the retention of a poison, and our theories that purgation and sweating are capable of carrying off this poison are certainly not positively established. But because of our belief in the pathogenesis of this condition, and our faith in the effect of eliminating meas-

ures, we persuade ourselves that we see beneficial effects from the treatment.

It seems to me fair to conclude that we are justified in giving credence to claims of therapeutic usefulness when the known action of the drug permits of a plausible explanation of its asserted benefits, not inharmonious with the accepted theories of the disease and supported by a fair amount of bedside corroboration.

In the absence of a reasonable hypothesis as to the mode of action, a gigantic accumulation of clinical evidence may establish the utility of any therapeutic measure; but when a candidate for therapeutic recognition can present no scientific logic, or only one which is demonstrably erroneous, and its clinical credentials are both vague and scanty, we are certainly justified in regarding its claims with suspicion.

It is my purpose to judge some traditional remedies by the standard set forth; if there is neither reason nor result to appear in defense of a drug, no matter how ancient its lineage may be, I opine it should be relegated to the limbo of all forgotten superstitions.

COMPOUND SYRUP OF HYPOPHOSPHITES.

This preparation, which is so widely employed as a tonic, especially in tuberculous conditions, contains, beside the hypophosphites of calcium, magnesium, potassium and sodium, small quantities of iron, of quinin and of strychnin. The amount of iron in 2 fluidrams of the syrup, which is the pharmacopeial dose, is equivalent to approximately $\frac{1}{20}$ grain, of quinin $\frac{1}{8}$ grain, and of strychnin $\frac{1}{45}$ grain. It is manifest that neither the iron nor the quinin can have any effect on the body, and that the strychnin can have only an infinitesimal hypothetic action. As for the hypophosphites themselves, they owe their introduction into medicine to a Dr. Churchill.⁴ His theory was that phthisis was due to diminished oxidation in the tissues; phosphorus has a strong affinity for oxygen and therefore would attract oxygen into the body, but it is too highly poisonous for remedial use; the hypophosphites, being incompletely oxidized derivatives of phosphorus, would have the same affinity for oxygen, and being only slightly poisonous, could be given in larger dose. As regards this theory it may first be pointed out that there is no reason to believe that there is diminished oxidation in phthisis; in fact it

⁴ For the history of the hypophosphite fallacy see *The Journal A. M. A.*, April 25, 1914, p. 1346.

would seem that it is usually increased; secondly, the hypophosphites pass through the body unchanged, that is, they do not attract oxygen in sufficient quantity to oxidize themselves.

Supposing, however, that Churchill's theory of the cause of tuberculosis were true, it would in no way argue in favor of the use of the compound syrup of the hypophosphites as a practical remedy. An ordinary man burns up from 800 to 1,000 gm. of oxygen a day. It requires about 3 per cent. of oxygen to saturate the earthy hypophosphites; compound syrup of hypophosphites contains, in all, approximately 7.5 per cent. of hypophosphites; therefore 2 teaspoonfuls of the compound syrup of hypophosphites has theoretical attractions for 0.018 gm. of oxygen. To cause an increase of 10 per cent. in the daily consumption of oxygen would require a dose of about 4,000 Cc., or 1 quart four times a day. While it is possible that a patient might survive the hypophosphites in this quantity, he would certainly die of strychnine or quinine poisoning.

Dr. Churchill's theory having been shown to be erroneous, it would require, according to the postulates given above, the most positive clinical evidence to establish his conclusion. In the book of over 250 pages announcing his discovery,⁵ he reports the results of thirty-five cases, of which nine patients were classed as cured, eleven as improved, and fourteen died! Even allowing for the progress which has been made in recent years in the management of tuberculosis, this record seems hardly favorable enough to justify his conclusions as to the specificity of the treatment. As for other clinical evidence, it is equally unconvincing. There has been a relatively small number of papers in medical literature on this subject, and most of those which have appeared are made up almost entirely of such vague generalities as "the treatment has given me good satisfaction." In a brochure published in 1881 by McArthur—who, being commercially interested in this therapeutic measure, is not likely to have overlooked any reports favorable to it—the statement is made that the favorable conclusions are based on 259 cases, certainly not an overwhelming mass of evidence after twenty-three years of clinical trial!

Churchill recommended only the hypophosphite of lime, but Dr. McArthur modified this by adding also the hypophosphites of potassium and sodium and dispensing in the form of syrup. It is interesting to note that the real out and out hypophosphitists maintain that

⁵ Churchill: *Phthisie Pulmonaire*, 1858.

neither strychnine nor iron should ever be combined with the hypophosphites. Nevertheless an English pharmacist by the name of James I. Fellows, about 1870, put on the market a syrup of composition similar to that which is present in the United States Pharmacopeia. The origin of this compound, according to Fellows' claim, was his own personal experience. He had a chronic bronchitis which by some of his medical friends was pronounced tuberculous, although there seems to have been great difference of opinion among the various physicians who examined him as to the nature of his malady. He began to experiment on himself with various combinations of drugs which he imagined might be beneficial. After four years of such self-dosing he completely regained his health and attributed the result to the concoction which is now known as Fellows' Compound Syrup of Hypophosphites.

Fellows' explanation of the *modus operandi* of the remedy is even more remarkable than that of Dr. Churchill. Thus he begins his brochure in 1882 with the words, "This is a combination of salts allied to blood salts, and consequently true hematics, with the blood building iron and the two powerful vegetable tonics strychnine and quinine."⁶ Sodium chlorid is just as nearly "allied to the blood salts" as any salt in his syrup, but one would hardly attribute to ordinary salt any specific virtues in tuberculosis.

On page 8 of the same brochure he says: "The hypophosphorus acid *seems*⁷ to furnish the phosphorus for the construction of lecithin more readily than the stable form phosphoric acid. Consequently . . . the less stable form of hypophosphites can be broken up for the production of free phosphorus for the production of lecithin." In support of this hypothesis he gives not the slightest scintilla of evidence, but goes on the common principle of *nostrum venders* that any assertion made with sufficient dogmatism will be accepted by the medical profession. To the contrary, the investigations of Boddaert,⁸ of Mossol and Gamel,⁹ and of Panzer¹⁰ have shown definitely

⁶ As a further example of the pseudoscientific jargon indulged in by the hypophosphitists, I may quote the following from a paper by Alcindor (Practitioner, London, 1913, xc, 123): "Prosphorus initiates and promotes among the bioplasmic elements, oxidation of the tissues, which is the primordial phenomenon of vitality, with consequent integration and disintegration and elimination of effete products."

⁷ Italics ours.

⁸ Boddaert: Arch. de pharmacod., 1895, ii, 195.

⁹ Mossol and Gamel: Jour. de pharm. et de chim., 1901, xiv, 337.

¹⁰ Panzer: Ztschr. f. Untersuch. d. Nahrungs-u. Genussmittel, 1902, v, ii.

that the statement is untrue, the hypophosphites passing through the system and being eliminated by the kidneys as any foreign salt.

An unbiased study of the evidence, it seems to me, must inevitably lead to the conclusion that any therapeutic virtue in the compound syrup of hypophosphites is due to the sugar it contains.

Some skeptical empiricist rises up to ask, If this mixture is so impotent why is it so widely employed? The reasons for its popularity are two: First, and most important, the persistent advertising methods of the manufacturers of certain brands of the compound syrup of hypophosphites, and secondly, its innocuous character. It is better to do nothing than to do the wrong thing, and when the patient insists on having some form of medicine and the physician knows of no drug which is likely to be beneficial, he satisfies the longing of the sick man by ordering the compound syrup of hypophosphites, and salves his conscience with the thought that at least he has done no harm.

LITHIA.

The use of salts of lithium in the treatment of gout was introduced by Garrod.¹¹ He based his application of this remedy on the hypotheses that the gouty paroxysm is due to the deposit of urates in the joint, that this deposit is brought about by a diminished alkalinity of the blood which lessens the solubility of the salts of uric acid, and that lithia by a solvent action on the uric acid prevented the deposit. In support of the latter view he quotes the experiments of Binswanger, who found that one part of lithium carbonate in 120 of water would dissolve four parts of uric acid at the body temperature, and of Uré,¹² who showed that 1 grain of lithia in an ounce of water would dissolve 2.3 grains of uric acid.

Neither his theory concerning the causation of the gouty attacks nor his explanation of how lithium would prevent them can be accepted. In the first place, Magnus-Levy¹³ measured the alkalinity of the blood of twelve patients before, during and after the gouty paroxysm, and failed to find any distinct change in its alkalinity. In the second place, conditions accompanied with severe reduction of the bodily alkalinity, such as diabetic coma or leukemia, do not lead to the deposit of urates. In the third place, acidulating the blood cannot change the solubility of sodium urate without transforming

¹¹ Garrod, A. B.: *Gout and Rheumatic Gout*, London, 1861.

¹² Uré: *Pharm. Jour.*, August, 1843.

¹³ Magnus-Levy: *Harvey Lecture*, 1910, p. 269.

it into uric acid, and the deposit in the joints is not of the acid but of the monosodium urate.

As regards the solvent properties of lithium toward uric acid, while it may be regarded as true that relatively concentrated solutions of lithium will dissolve more uric acid than water, yet in proportions in which it can occur in the blood it exercises no such solvent effect. Krumhoff¹⁴ found that water containing 0.012 per cent. of lithium chlorid would *dissolve less uric acid than distilled water*. Roberts¹⁵ says that he has found experimentally that the addition of lithium carbonate in the proportion of 0.1 per cent. or 0.2 per cent. to blood serum had not the slightest effect in enhancing the solvent power of this medium for sodium urate. Good¹⁶ found that the fatal dose of lithium chlorid for the cat was less than 0.4 gm. per kilogram hypodermically. Supposing that the lithium was equally distributed throughout the various tissues of the body, this would mean evidently a concentration of 0.04 per cent. in the blood. It is manifest, therefore, that lithium if given even in fatally toxic doses cannot increase the solvent power of the blood for the salts of uric acid.

Some have attempted to attribute the supposititious beneficial action of lithium in gouty conditions to its diuretic powers or to its antacid action. As to the former, Good found that lithium chlorid has no greater diuretic power than sodium chlorid. As to the alkalizing properties, while it is true that by the administration of sufficient doses of the carbonate or citrate of this base one can render the urine alkaline, the same thing is true of the corresponding salts of either sodium or potassium. Moreover, there is, to say the least, grave doubt as to the real benefit of alkalies in gout. Roberts says, "I have repeatedly administered the bicarbonate and citrate of potash continuously for three or four years in sufficient doses to maintain the urine persistently alkaline, yet I have seen the arthritic attacks recur with apparently unabated regularity."

It is to be noted that even if we accept Garrod's theories, the use of lithium must be limited to cases of typical gout with paroxysmal attacks of arthritis. Even the blind adherence to these improbable hypotheses affords no reason to believe in its usefulness in the various atypical manifestations of disturbed metabolism which we

¹⁴ Krumhoff: Inaug. Diss., Göttingen, 1884.

¹⁵ Roberts, William: On the Chemistry and Therapeutics of Uric Acid Gravel and Gout, Croonian Lectures for 1892, London, 1892, p. 129.

¹⁶ Good: *Am. Jour. Med. Sc.*, 1903, cxxv, 273.

are in the habit of attributing somewhat loosely to the uric acid diathesis. By the strange irony of chance, in this country, at least, the use of the salts of this metal is limited almost exclusively to the latter group of cases.

(To be continued)

PHARMACEUTICAL CORPS IN THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY.

Mr. EDMONDS introduced the following bill in the House of Representatives, July 25, 1917, which was referred to the Committee on Military Affairs and ordered to be printed.

65th CONGRESS 1st SESSION. H. R. 5531.

A BILL

To increase the efficiency of the Medical Department of the United States Army, to provide a Pharmaceutical Corps in that department, and to improve the status and efficiency of the pharmacists in the Army.

Be it an act by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter there shall be attached to the Medical Department of the United States Army a Pharmaceutical Corps, composed of citizens of the United States, to perform the duties defined in this Act and such related duties as may be prescribed, from time to time, by the Surgeon General.

SEC. 2. That the Army Pharmaceutical Corps shall consist of one pharmacist director, with rank of major, who shall be chief of the Pharmaceutical Corps, five deputy pharmacist directors, with the rank of captain, and such number of pharmacists, with the rank of lieutenant, and of pharmacist apprentices, as may be needed for the service,

SEC. 3. That the Army Pharmaceutical Corps shall be charged with the following specific duties: To procure by purchase or manufacture all supplies of medicines, drugs, chemicals, pharmaceutical apparatus, and hospital and surgical dressings necessary for the Medical Department of the Army; to determine the quality and purity of such supplies; to have charge of the medical supply depots of the Army and the storage and safeguarding of such supplies; to provide for the issuance and distribution of such supplies and the

dispensing of medicines in the various hospitals, dispensaries, infirmaries, trains, and camps of the Army; to properly care for, regulate the dispensing, and to systematically account for all spirituous liquors and habit-forming drugs purchased for the department; to procure by purchase or manufacture such drugs, chemicals, reagents, tests, and biologic products as are used in the laboratories and the medical and surgical practice of the department for the purposes of diagnosis, prophylaxis, or treatment; to account for all moneys received from sales of medical supplies, in accordance with the provisions of the Army regulations or disposed of by order of competent authority; to inspect the department's stores and supplies of drugs, medicines, hospital dressings, reagents, tests, and biologic products and determine their deterioration and fitness for use; to coöperate with the other branches of the department in rendering first aid and wound dressing and in the making of diagnostic and chemical tests, to establish and maintain a systematic course of study and training, including the advances made in medicine, pharmacy, and sciences allied thereto, to be pursued by the members of the Army Pharmaceutical Corps who are seeking promotion in the corps.

SEC. 4. That the pharmacist director shall be a graduate of a reputable school of pharmacy, have had not less than five years of pharmaceutical experience, and have established a creditable record in the profession of pharmacy.

The duties of the pharmacist director shall include the following: To have supervision over the Army Pharmaceutical Corps; to see that discipline is maintained and duties are efficiently performed; to formulate rules and regulations, subject to the approval of the Surgeon General, for coördinating the work of the Pharmaceutical Corps with the duties of the other branches of the Medical Department to approve all contracts for supplies procured by the corps; to inspect, either in person or by deputy, all deliveries of supplies and pass upon the purity and quality thereof, and compliance with specifications and the acceptance or rejection; to have the authority to inspect the manufacture of such supplies, and to direct their manufacture in any factory or laboratory that may be taken over by the Government, or that may be established by the Government, for their production; to establish standards for supplies of non-official drugs, chemicals, and preparations, and, where feasible, prescribe the methods of assay for these; to publish, with the approval

of the Surgeon General, formulas for nonofficial preparations, reagents, and tests used in the Army Medical Department, and all formulas so published shall be authoritative in the Army Medical Department; to recommend alternates or substitutes for proprietary, expensive, rare, or unobtainable drugs or preparations; to prepare specifications and estimates for Army medical supplies; to pass upon requisitions for supplies; to provide regulations for the storage, safeguarding, and preservation of Army medical supplies, and the distribution and issuing of such supplies; to see that accounts of the receipts and disbursements of all supplies are properly kept, with special records of the purchases and disposition of spirituous liquors and habit-forming drugs; to have inspections made of the medical supplies, and recommend appropriate disposition of condemned, deteriorated, or unreliable supplies; to preserve the files, correspondence, and official records of the corps; to prepare a syllabus covering a systematic course of professional study to be followed by members of the Pharmaceutical Corps; to coöperate in the professional examinations of applicants for enlistment in the pharmaceutical service, or for promotion within the corps; to recommend transfer of members of the Pharmaceutical Corps and promotion for service or special recognition for distinguished service. He shall outline a course of instruction for pharmacists if an Army pharmacist training school is established

In the absence of the pharmacist director a deputy pharmacist director shall be named as acting pharmacist director. The various duties specified above as within the province of the pharmacist director, with the approval of the Surgeon General, may be distributed or assigned to the deputy pharmacist directors.

The deputy pharmacist directors shall be pharmacists of unquestioned professional repute who are graduates of reputable schools of pharmacy and have had not less than five years pharmaceutical experience.

Any American citizen, graduate of a reputable school of pharmacy, of good moral character and between twenty-one years and forty-five years of age, both inclusive, who can pass the usual physical examination required for appointment in the Medical Corps and the professional examinations, which shall include tests of skill in practical pharmacy and of proficiency in the usual subjects of a standard school of pharmacy course, may be appointed as a pharmacist in the Pharmaceutical Corps.

An original appointment as pharmacist under this Act shall entitle the appointee to the rank and commission of second lieutenant. After the expiration of the first five years of service, with honorable discharge, the pharmacist may reënlist at any time within six months from the date of expiration of such prior service, and he may then apply for examination for promotion, and if his physical examination and the professional examination in subjects of advanced pharmaceutical education are satisfactory, he shall be eligible for promotion to the rank and commission as first lieutenant, Pharmaceutical Corps. After fifteen years of service in the Pharmaceutical Corps a pharmacist with the rank of first lieutenant, Pharmaceutical Corps, may apply for examination for promotion. If he successfully passes the necessary examination in postgraduate pharmaceutical studies, and if in the opinion of the pharmaceutical director such promotion is merited, he shall be promoted to the rank and commission of captain, Pharmaceutical Corps.

Any citizen of the United States between seventeen years and thirty-five years of age, both inclusive, who can pass the necessary physical and preliminary educational examination prescribed by the Secretary of War may enlist as a pharmacist apprentice. Pharmacist apprentices shall act as assistants to the pharmacists and to the Hospital Corps. After serving for one year in this capacity the pharmacist apprentice may, with the approval of the pharmacist or the surgeon under whom he has served, apply for examination for promotion; and if he passes the examination in preliminary education and the elementary pharmaceutical branches, he shall be promoted to the grade of pharmacist apprentice, first class, with rank as sergeant. After five years of service, with honorable discharge, the pharmacist apprentice may reënlist and may apply for examination and promotion to the grade of pharmacist with commission as second lieutenant: *Provided*, That after two years of service the Secretary of War, upon recommendation of the pharmacist director, may grant to a pharmacist apprentice sufficient leave of absence from the service to permit the apprentice attending a school of pharmacy to fit himself for advanced rank in the Pharmaceutical Corps. Such leave of absence shall be without pay, but shall not be deducted in computing the length of service.

The Secretary of War is authorized to appoint boards of three examiners to conduct the professional examinations herein prescribed: *Provided*, That at least one member of each of the boards so appointed shall be a pharmacist.

That, whereas there are now in the service of the War Department a number of pharmacists and druggists ranking as master hospital sergeants, hospital sergeants, sergeants first class, and sergeants, all such shall be eligible to transfer to the Pharmaceutical Corps created by this Act and to the service, rank, pay, and promotion in rank as provided herein, and that the time already spent as pharmacists in the War Department shall be computed as part of their service in the Pharmaceutical Corps.

That in emergencies the pharmacist director, upon the recommendation of the Surgeon General and with the approval of the Secretary of War, may appoint as many contract pharmacists as may be necessary, at a compensation not exceeding \$150 each per month, and provided that the age limit and professional examination may be waived in the case of any contract pharmacist whose character, experience, and professional education is deemed by the pharmacist director to be satisfactory. The temporary appointment of a contract pharmacist shall not carry commission or right of retirement in accordance with the Army Regulations.

SEC. 5. That all appointees authorized by this Act shall take rank and precedence in the same manner in all respects as in the case of appointees to the Medical Corps of the Army, and shall not exercise command over persons other than those in the Pharmaceutical Corps and such enlisted men as may be detailed to assist them by competent authority.

That all officers of the Pharmaceutical Corps shall receive the same pay, awards, and allowances as the officers of corresponding rank and length of service in the Medical Corps of the Army and shall be eligible to retirement in the same manner and under the same conditions.

That the pay of the pharmacist apprentice shall be \$33 per month and that of the pharmacist apprentice first class, with rank of sergeant, shall be \$37 per month, and for each reënlistment in this service they shall receive the usual increase allowed in the Army for honorable discharge and reënlistment.

SEC. 6. That all laws and parts of laws inconsistent with the provisions of this Act be, and the same are hereby, repealed.

PHARMACEUTICAL CORPS IN U. S. ARMY.

BRIEF SUBMITTED TO SURGEON GENERAL GORGAS ADVOCATING THE ESTABLISHING
OF A PHARMACEUTICAL CORPS IN THE U. S. ARMY.

MAJOR GENERAL W. C. GORGAS,
Surgeon General of the U. S. Army,
Washington, D. C.

Dear Sir: On July 24th last, a conference was held at your office between a board of army medical officers, composed of Col. George E. Bushnell, Majors E. P. Wolf, F. F. Russell and Stewart McGuire, and a committee of pharmacists, at which was discussed the proposition that a Pharmaceutical Corps be established as a branch of the Medical Department of the Army.

At the close of this conference, it was agreed that the undersigned should prepare for the consideration of the Surgeon General a formal argument or brief setting forth the views of the pharmacists as to the needs for and the benefits to be obtained by the establishment of the Pharmaceutical Corps.

Pursuant to that agreement, this statement has been prepared and is presented to the Surgeon General with the request that the facts and arguments set forth herein receive his official consideration and with the hope that the importance of increasing the efficiency of the Medical Department by the establishment of a Pharmaceutical Corps will be so impressed upon him that this proposition will merit his approval and endorsement.

PHARMACY A SCIENTIFICALLY DEVELOPED BRANCH OF MEDICINE.

The progress of the medical sciences has necessitated differentiation and specialization and this has separated modern medical practice into various branches, as medicine, surgery, dentistry, veterinary medicine and pharmacy. The pharmacist is now scientifically and systematically trained to fill a specific need of society. Upon the proper performance of the duties of the pharmacist the other practitioners of medicine are compelled to rely. Unless the drugs are properly selected and the medicines properly prepared and dispensed, their skill goes for naught. Upon the faithful and capable performance of the work of the pharmacist depends the

success of the medical profession, and, likewise, the lives of the patients.

American pharmacists hold a prominent position in the world development of their profession. The United States Pharmacopœia ranks as the peer of any national pharmacopœia. In the more recent revisions of this authority, the pharmacists have contributed very largely the chemistry, botany and pharmacognosy of the standards as well as most of the formulas contained therein. The other legal authority for medicines, the National Formulary, has been prepared entirely by a committee of the American Pharmaceutical Association. It is inconceivable that the War Department should ignore this important branch of the medical professions and to-day has not commissioned in its service a single eminent pharmacist. Pharmacy is recognized as the right arm of medicine in civil life and there is no reason why this position is lost in military duty.

The value of pharmacy as a national asset should not be lost sight of, especially in the present exigency, when it must be recognized that the success of our Nation in this war will depend upon the proper utilization of every available talent. It is just as reprehensible to waste talent as to waste materials. The former is as much the property of the citizenship as is the latter and they are entitled to its conservation and the protection which it affords.

THE SOLDIER IS THE ULTIMATE CONCERN OF THE MEDICAL DEPARTMENT.

Those in the military service of the nation are entitled to the very best medical attention that the government can procure. A nation that is proclaimed as the wealthiest and as the most progressive of all nations must not assume any second place in providing means for the preservation of the health and lives of those serving in its army. The people of the United States will expect the Medical Department to adopt the most efficient methods for the conservation of the health and lives of our soldiers and for the recuperation of the unfortunate wounded.

Surgeon General Geo. J. H. Evatt of the British Army very aptly stated: "That the Medical Department existed for the individual benefit of the soldier and if they failed in their duty to him they were not faithfully discharging their obligation. The ultimate soldier was the person whom they all served."

DISPENSING OF MEDICINES IN THE GOVERNMENT SERVICE NOT IN ACCORDANCE WITH STATE PHARMACY LAWS.

The dispensing of potent remedial agents, whether in civil practice or in the military service, should be restricted entirely to those who have been especially educated and trained as compounders and dispensers of medicines. This principle is so thoroughly established that the States, and likewise the District of Columbia and our insular possessions, in the exercise of their police power, have by legal enactment provided for boards of pharmacy to examine and license those to whom authority only is given to compound and dispense medicines.

The Army medical supplies necessarily include such poisonous drugs or their preparations as aconite, atropine, belladonna, cocaine, colchicum, hyoscyamus, morphine, nux vomica, opium and strophanthus. The dispensing of these in the army is not only "done by non-commissioned officers of the Medical Department," but quite commonly by those whose lack of education and training would preclude them from the examinations of any Board of Pharmacy. Surely the soldier is entitled to pharmaceutical service and protection equal at least to that which his State provides for him in civil life.

DANGER IN FOLLOWING THE ERRORS OF THE BRITISH ARMY MEDICAL DEPARTMENT.

Unfortunately, the United States has copied the methods of the British Army Medical Department, whose service has been denounced at home as "obsolete," "incompetent" and "inefficient." Great Britain and the United States are the only two prominent nations whose army medical service does not provide for an organized pharmaceutical corps.

In England this serious defect has been forcefully pointed out and the comparisons made with the well organized and equipped medical and pharmaceutical corps of the continental armies have not been at all creditable to their home government. The "Pharmaceutical Journal and Pharmacist" of London in a recent editorial states: "The British Pharmaceutical Council has already been compelled to report several cases of poisoning that had occurred in hospitals because of untrained dispensers."

The investigations of the causes of the failure of the British

Expedition in Mesopotamia present a most harrowing account of a horrible calamity. The intolerable suffering of the soldiers through the lack of medical attention is not only deplorable, but it is inexplicable that in a modern army, existing under the present status of medical knowledge, such a condition could possibly have occurred. Upon the insufficiency of the medical provisions and the inefficiency of the Medical Department much of the blame for the collapse of this unfortunate expedition is now officially placed. No more striking example of the danger of following obsolete methods could be presented.

READY MADE MEDICINES A SOURCE OF DANGER.

The statement has been officially made that "the pharmaceutical preparations of the Army, especially in time of war, are for the most part in tabloid form; the pharmacy is therefore a matter of dispensing rather than of compounding of preparations." This indicates that pharmacy as practiced in the U. S. Army is very elemental indeed and that even the very basic ideas of professional pharmacy are ignored. Such service must necessarily be far from being satisfactory or efficient or protective of the interests it is supposed to serve.

On the battle line and in the advanced positions, drug dispensing is necessarily limited and confined mainly to first aid. However, in the hospitals and in the convalescent homes and infirmaries treatment is given to many sufferers from disease as well as the wounded and here will be found thousands of cases requiring continuous and extensive treatment and such cases will rapidly multiply as the war is prolonged. To seriously propose that such shall be treated with "canned medicines" in "tablet form" and denied the services of competent compounders of medicines, is certainly not in accordance with our present knowledge of what is essential to conserve life, whether in time of peace or "in time of war."

Tablets are for some purposes a very convenient and useful dosage form, but for many purposes and for many medicines they are absolutely unfitted. Not infrequently, where prompt and reliable action is necessary, the conscientious physician is compelled to select some other form of modification. The most serious evil resulting from this "ready made medicine" and tablet dosage is that too often the patient is made to fit the tablet on hand instead of a remedy being prescribed to fit the needs of the patient. There can

be no question as to the superiority of the individual treatment over this method of "treatment en bloc." The proper method, and the ideal professional method, would be for the physician or surgeon to diagnose each case, prescribe what that patient needs at that time and to have the medicines compounded freshly and dispensed by a competent pharmacist. To do otherwise, is dangerous to the life of the patient and detrimental to the medical service.

COMPARISON OF THE ARMY PHARMACEUTICAL SERVICE OF FOREIGN NATIONS WITH THAT OF THE UNITED STATES.

No one has, as yet, estimated the percentage of mortality in the Army resulting from improper and inefficient medical service. The statistics that have been compiled, however, show that in the past wars, the number of men dying from disease was many times that killed by the enemy. "During the Civil War, the Union Army lost by deaths from disease 186,216 and 93,369 were killed." "In the Spanish-American War of 1898, only 454 Americans were killed and 5,277 died from disease."

In the Russo-Japanese War, the Japanese demonstrated the life saving value of a scientific and systematically organized medical department and the remarkable reduction of mortality from disease and wounds in the Japanese Army during that war attracted world-wide attention.

In the present World War, Germany reports that 87 per cent. of her wounded are returned to the service. This remarkable conservation of life is very properly attributed to the efficient service of her highly trained medical corps and accounts very largely for the ability of the Germans to keep up their vast armies on all the war fronts. It is reasonable to assume that a due share of the credit for this efficient hospital service is due to the German Army Pharmaceutical Corps.

The pharmaceutical service in the German Army was completely reorganized in 1902. Since that date, the pharmacists, in addition to performing purely pharmaceutical duties, have been given charge of the hygienic, chemical and research laboratories of the army and each ranking officer in the Pharmaceutical Corps must have taken the special course in certain official laboratories and have obtained a diploma as a chemist qualified to examine foods.

Each army corps has an associated sanitary corps under the con-

trol of an apothecary officer who has charge of the pharmaceutical service and supplies and is the director of the laboratory connected with that corps. Each army corps has likewise a supply depot and a manufactory of supplies which furnishes the medicines and dressings for that army corps. The medicines kept in hand for the hospitals include nearly all the official pharmaceutical preparations.

The commander of the German Army Pharmaceutical Corps is the Oberstabsapotheker who is attached to the Medical Section of the Prussian Minister of War and his rank is equal to that of a general of a brigade.

France has an organized Army Pharmaceutical Corps, the commander of which is called the inspector and with rank as brigadier general. The complete organization includes the titles of principal pharmacists, pharmacists, pharmacist-majors and assistant pharmacist-majors and ranking as colonels, lieutenant colonels, majors, captains and lieutenants. When the French peace army of 500,000 men was rapidly increased to 3,500,000 trained soldiers, the pharmaceutical corps was automatically increased from the pharmacists in reserve, many of whom had already held commissions and had experience in the sanitary corps.

In January, 1915, over 1,200 of the mobilized pharmacists who had the necessary experience and training in the service, were commissioned as first class assistant pharmacist-majors, ranking as lieutenants. The pharmaceutical corps in France manufactures many of the army supplies and is charged with the chemical examination of water, foods, and army supplies and a pharmacist of rank is attached to the Sanitary Council of each military district.

In Spain, as early as 1813, the Military Pharmacy Corps was promulgated. Despite the several changes and reorganizations of the Sanitary Corps that have taken place in that country since that date, the organization has been continued and its work made more comprehensive and beneficial. Its personnel comprises inspectors, sub-inspectors, pharmacist-majors, pharmacists of the first class and pharmacists of the second class and with commissioned rank from colonel to lieutenant.

In Japan, "the Army has a Sanitary Supply Department and the Director of this Department is equal in rank to a Colonel and wherever there is a Barrack, it has a field hospital, which has a Department of Pharmacy and the Director of this pharmacy is equal in rank to a lieutenant colonel. The rank of pharmacists in the Army is from a sub-Lieutenant to a Colonel."

In the United States Army we have no Pharmaceutical Corps whatever. We have no pharmaceutical supervision of medicines and hospital supplies. We have no governmental manufacture of medical supplies for the Army under the supervision of trained pharmacists. We have no specially trained pharmacists to attend to the dispensing and compounding. We have absolutely nothing that bears any semblance to a modern army pharmaceutical corps.

We have it officially stated that in the United States Army "the dispensing of drugs or compounding of prescriptions is done by the non-commissioned officers of the Medical Department." Many of these, as pointed out, could not qualify to practice pharmacy in civil life. Can the United States afford to have an Army Medical Department and service that is inferior to that of Spain or Japan? Can those in authority continue to ignore the value of the services of the pharmaceutical corps in foreign armies and the potent lessons of efficient organization?

An order has just been published by the adjutant general for the reorganization of the Army of the United States in conformity with the organization of the French Army. If we find the French models for the line troops worth following, it is reasonable to suppose that we should likewise follow their organization in the Sanitary Service, including the medical and pharmaceutical corps.

EFFICIENCY OF THE MEDICAL CORPS DEMANDS PHARMACEUTICAL ASSISTANCE.

The advice of Cicero to "Let each one exercise himself in the art which he knows" is but a more ancient expression of the doctrine of "every one to his trade and the right man in the right place." This principle is the very foundation of modern efficiency which is now demanded in every occupation. War is the supreme test of a nation's efficiency and in time of war it is of paramount importance that every man be put to that work in which he can render the most useful service to the nation. The magnitude of modern warfare demands the most perfect organization and the most effective service and nowhere is this of more importance than in the medical service of the Army and Navy.

Each line of activity requires specialized education and training and to permit one branch or activity to encroach upon the special field or duty of another means national inefficiency, if not actually

national suicide. To place a skilled army surgeon in charge of a medical supply depot to look after the procuring and distribution of medical and hospital supplies and the accounting thereof is, to say the least, wasteful of his special talent that may be sorely needed elsewhere. The military surgeon has more than enough to do, to attend to the strictly medical needs of the sick and wounded and to make the necessary examinations and reports.

The medical profession is now asking for higher rank for the Medical Corps of the Army and the increased authority that accompanies rank in the military service. Attention is likewise being directed to the need for skilled and adequate assistance and for relief from the non-medical work imposed upon the Medical Corps. In a recent article Dr. J. Madison Taylor writes:

"In my judgment there is grave peril that in the near future the demands upon the medical service will be so many and serious that it may break down from overwork. It is to prevent this, to anticipate, that we make the constructive suggestion, that steps be taken immediately to provide a sufficient number of assistants skilled in all these branches of service required for the Medical Corps.

"The medical man of the Army and Navy comes nearest to realizing this symbolic and wholly imaginary embodiment of omniscience, but in view of the terrific demands made upon him by modern warfare in time and work, if ever a man needed skilled and adequate assistance he is the man, and yet our Army and Navy is proceeding in the upbuilding of its medical service along the old, old lines of expecting the medical men to 'do it all.' The military service of France, Germany, Japan and other countries gives its medical men proper and sufficient assistance. We should do no less; we ought to do more."¹

It is very appropriate that the medical profession, in this time of exigency, should recognize that pharmacy is the rational support of medicine and that the pharmacist, specially educated in the collateral medical sciences and skilled by years of practical training, is prepared to give that assistance and support that is needed by the Medical Corps.

It is very gratifying to note that the leaders in the medical profession are outspoken in their support of pharmacy as a necessary

¹"Give the Military Surgeon Skilled and Adequate Assistance. He cannot do it all." J. Madison Taylor, M.D., *New York Medical Journal*, July 21, 1917.

branch of the military medical service and in favor of its proper recognition with commissioned rank.

In a recent letter to President F. J. Wulling, of the American Pharmaceutical Association, President Charles H. Mayo, of the American Medical Association, writes:

"I was very glad to see the action taken by the House of Delegates in recommending recognition of the pharmacists, and I hope it will bear fruit in advancing the recognition of the great benefits which can be derived from the use of pharmacists in the Army service."

The *Journal of the American Medical Association*, on June 16, 1917, editorially commented:

"So far as official recognition of it is concerned, the science and art of pharmacy might not exist for the Army. To-day, as never before, victory in war goes to the nation that most effectively conserves the health of its fighting men. The physician is now of such military importance that the medical profession will be called on to make no inconsiderable sacrifices. It will materially lighten the arduous duties and responsibilities of the physician to have in the Army trained pharmacists who will be able to give intelligent co-operation. But it is imposing too great a strain on the patriotism of those whose special knowledge is obviously a large asset to the Army, to expect them to enlist as privates without any recognition of their national worth. Pharmacists should be given a rank commensurate with their importance, first because it is but simple justice to the pharmacists themselves, secondly, because the usefulness of the Medical Corps will be greatly augmented and, lastly, and most important, because the efficiency of our Army demands it."

THE DUTIES OF THE PHARMACEUTICAL CORPS.

In the absence of any attempt in the past to organize the pharmaceutical service in the Army, the duties that might be assigned to a Pharmaceutical Corps can only be tentatively outlined. The provision of the various foreign army pharmaceutical corps will furnish excellent models for the duties of such a corps. These have been very generally followed in the fairly comprehensive line of duties stated in the bill introduced by Congressman Edmonds, entitled

"A Bill to Increase the Efficiency of the Medical Department of

the United States Army, to provide a Pharmaceutical Corps in that department, and to improve the status and efficiency of the pharmacists in the Army" (H. R. 5531).

No doubt the experience of other nations will be duplicated in that the duties assigned to the Pharmaceutical Corps will rapidly increase, and with such increase of duties the corps will grow in usefulness and importance. Eventually, it may be placed in control of not only the providing, manufacturing and distributing of pharmaceutical and hospital supplies, but also, as in foreign countries, of the various hygienic, chemical, analytical and research laboratories of the Army.

NO RADICAL REORGANIZATION CONTEMPLATED.

The formation of a Pharmaceutical Corps in the Army Medical Department, as provided for in H. R. 5531, does not contemplate any radical changes or reorganization of the Department. By a readjustment of the regulations, the Medical Corps can be relieved of its burden of non-medical duties, records and accountings. The Pharmaceutical Corps should be promptly organized to take up its various duties and to coördinate its work with that of the medical, dental, veterinary and nurse corps of the military service.

Respectfully submitted,

GEORGE M. BERINGER,
*President National Pharmaceutical
Service Association.*

JOSEPH W. ENGLAND,
*Committee on National Defense,
American Pharmaceutical Association.*

REPORT OF THE SIXTY-FIFTH ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

BY PROF. CHARLES H. LA WALL.

The Indianapolis Meeting of the American Pharmaceutical Association, held during the week of August 27, was one which will long be remembered for many good and worthy reasons.

It was a meeting peculiarly representative of all that is good in

the "body pharmaceutic," to use a happy phrasing introduced by President Wulling in his annual address to designate the entire grouping of associations connected with pharmacy.

From east and west, from north and south assembled pharmacists, retail, wholesale and manufacturing; pharmaceutical educators; members of pharmacy boards, pharmaceutical journalists, government officials and others, to discuss problems and take action upon questions affecting the progress of the profession, and thus, indirectly, the welfare of the public at large.

The enrollment, which reached a total of more than 300 members and others interested, was not far below that of the Atlantic City Meeting of 1916 and was contributed to by the fact that Indianapolis is very nearly the geographical center of the United States. As usual the concurrent meetings of the National Association of Boards of Pharmacy and of the American Conference of Pharmaceutical Faculties were held during the same week. The former body was ably presided over by President Lawrence C. Lewis, of Tuskegee, Ala., who was assisted by Secy. H. C. Christensen, of Chicago, Ill. Meetings were held on Monday, August 27, at 9.30 A.M.; 2.00 P.M. and 8.00 P.M. and on Tuesday, August 28, at 9.30 A.M. Joint meetings with the American Conference of Pharmaceutical Faculties were held on Tuesday, August 28, at 10.00 A.M. and 2.00 P.M. and a combined meeting with the Section on Education and Legislation of the A. Ph. A. and the Conference of Faculties on Friday, August 31, at 2.00 P.M.

Many excellent papers were presented and discussed at these meetings. The officers of the National Association of the Boards of Pharmacy elected for the ensuing year were: President, W. P. Porterfield, Fargo, N. Dak.; vice-presidents, John A. Weeks, Ballinger, Tex.; W. R. Jarrett, Oklahoma City, Okla.; George D. Newcome, Creston, Ia.; secretary, H. C. Christensen, 450 Bowen avenue, Chicago, Ill.; treasurer, Charles H. Skinner, Windsor, Vt.; chairman of the advisory examination committee, H. C. Christensen, Chicago, Ill.; members of the executive committee, E. G. Cox, Craig, Mo., John Culley, Ogden, Utah, and H. E. Purdy, Derby, Conn.

The American Conference of Pharmaceutical Faculties was in session during Monday and Tuesday. President R. A. Lyman, of Nebraska, read a very interesting address, which contained some very radical recommendations and was referred to a committee

consisting of W. C. Anderson, of New York; C. E. Caspari, of Missouri, and C. A. Dye, of Ohio. Among the recommendations was one regarding preliminary training of pharmacists, which was settled after much discussion by the adoption of September 1, 1923, as the date for the inauguration of a four-year high school entrance requirement by the colleges who are members of the conference.

There were fifteen recommendations altogether, most of which were concerned directly with the work of the Conference itself.

The newly elected officers of the Conference for 1918 were: President, Henry Kraemer, of Philadelphia; Vice President, Charles E. Caspari, St. Louis; Secretary and Treasurer, Thos. J. Bradley, Boston; Chairman of Executive Committee, R. A. Lyman, Lincoln, and F. J. Wulling, Minneapolis; Syllabus Committee, A. Bolenbaugh, Richmond.

The general sessions of the American Pharmaceutical Association were three in number. They were held on Tuesday, August 28, at 8.00 P.M., on Thursday, August 30, at 2.30 P.M., and on Saturday, September 1, at 10.00 A.M. At the first of these sessions President Wulling read his address, which was a scholarly production, filled with food for thought and discussion. The keynote of the address, and the principal one of the few recommendations which were contained in it, was a series of convincing arguments showing the need for a federation of all pharmaceutical organizations with permanent headquarters, resident officers, a substantial endowment fund and the support of what President Wulling aptly termed the entire "body pharmaceutic."

Another recommendation was for winter meetings to replace the present summer gatherings. This address was referred to a committee consisting of H. V. Arny, chairman, Charles E. Caspari, R. A. Lyman, Julius A. Koch and Charles H. LaWall.

The committee reported favorably on the recommendation for the establishment of a committee looking toward the proposed federation, and urged the reference of the matter of winter meetings to the members at large. The reports of the officers and committees of the general association were comprehensive and satisfactory and show the association to be in an active and flourishing condition.

At the second general session was presented the report of the committee on President's address for 1916. J. H. Beal, chairman, read the report, which completely vindicated the officers of the association from the charges and innuendoes contained in the address, accompanying the report with much documentary evidence

taken from the proceedings and files of the association. The committee recommended that the address be released for publication upon condition that any journal publishing it be required to publish, in full, the report of the committee concerning it. After some discussion it was decided to drop the entire matter from publication and to file the address and the committee's report in a safe place in the archives of the association.

At the second session the following report of the nominating committee was presented for election by ballot by mail in the usual manner:

Nominees for President: J. A. Koch, Pittsburgh; Chas. H. LaWall, Philadelphia; and Leonard H. Seltzer, Detroit, Mich.

Nominees for First Vice-President: F. W. Nitardy, Denver, Colo.; E. A. Ruddiman, Nashville, Tenn.; and Jacob Diner, New York.

Nominees for Second Vice-President: T. J. Bradley, Boston; W. W. Stockberger, Washington, D. C.; and H. C. Christensen, Chicago.

Nominees for Third Vice-President: Frank Schachleiter, Hot Springs, Ark.; L. C. Lewis, Tuskegee, Ala.; and Francis C. Hemm, St. Louis, Mo.

Nominees for Members of the Council: Three to be elected: Chas. Holzhauer, Newark, N. J.; W. J. Teeters, Iowa City, Ia.; C. B. Jordan, Lafayette, Ind.; Caswell A. Mayo, New York; R. A. Lyman, Omaha, Neb.; Chas. E. Caspari, St. Louis; O. F. Claus, St. Louis; G. F. Payne, Atlanta; and John C. Wallace, New Castle, Pa.

At the final general session the minutes of the council were read and approved, except as to the subject of pharmaceutical research. In this matter the recommendation of the scientific section that a permanent research committee of ten members, with terms of five years each, be appointed by the council, was adopted. Among the important features of the council minutes as approved was the provision that 50 per cent. of the net profits from the sale of the National Formulary should be set aside and be called the American Pharmaceutical Association Research Fund.

At this session President Wulling installed the officers elect, as follows: President, Charles Holzhauer; First Vice-President, Alfred R. L. Dohme; Second Vice-President, Leonard A. Seltzer; Third Vice-President, Theodore J. Bradley; Members of the Council, Frederick J. Wulling, George M. Beringer, and Jacob Diner, New York, N. Y.

Appropriate resolutions of thanks were extended to the retiring officers and to the various local committees who had aided in making the meeting a success.

The various sections of scientific and educational character were well provided with interesting programs, as will be evidenced by the following schedule of officers and programs:

SCIENTIFIC SECTION.

Officers: Chairman, J. L. Turner; First Vice-Chairman, B. L. Murray; Second Vice-Chairman, A. W. Linton; Secretary, W. W. Stockberger.

Committee on Ebert Prize: Julius A. Koch, Pittsburgh, Pa., Chairman; Hermann Engelhardt, Baltimore, Md.; Chas. W. Ballard, New York, N. Y.

The following papers were presented: "Biological Products from the Pharmacy Point of View," L. E. Sayre; "Magnesium Sulphate—Its Pharmacological and Therapeutic Actions," Jacob Diner; "Rabies," E. G. Stewart; "Standardization of Digitalis," H. C. Colson, Jr.; "Solubility of Phosphatic Kidney Stones," W. F. Rudd and E. V. Greever; "The Significance of Cretinin and its Colorimetric Determination in Urine," W. F. Gidley; "The Microchemistry of the Alkaloids of *Datura Stramonium*," Chas. O. Lee; "Soy Bean Oil," E. V. Howell; "A New Method of Extracting Drugs for Alkaloidal Assaying," W. M. Maske, Jr.; "An Improved Method of Assaying Opium," W. M. Maske, Jr.; "Sulphur—Its Production and Use" (Illustrated with Lantern Slides), M. A. Mansbach; "Scientific Drug Farming" (Illustrated with Motion Pictures), H. C. Fuller; "The Cultivation of Drug Plants" (Illustrated with Lantern Slides), John A. Borneman; "Drug Cultivation" (Illustrated with Lantern Slides), F. A. Miller; "Breeding of Medicinal Plants," F. A. Miller; "The Cultivation of Henbane," N. R. Mueller. Symposium on Drug Plant Growing—Discussion opened by W. W. Stockberger, followed by Edward Kremers, E. L. Newcomb, F. A. Miller, H. C. Fuller and others. "Tolu and Sugar Coating in the Disguising of Medicines," Bernard Fantus; "Borax and Boric Acid," H. L. Harris; "The Analysis of Borax Soaps for the Borax Content," K. F. Ehmann and Joseph Harrison; "Tincture of Cantharides" (Fourth Paper), W. L. Scoville; "The Constituents of Senna Beans," W. L. Scoville; "The Microanalysis of Malted Milks," C. W. Ballard; "The Rela-

tions of the U. S. P. and N. F. to Food Standards," C. W. Ballard; "The Inversion of Sugar in U. S. P. Syrup," G. W. Lloyd Plette; "On the Deterioration of Crude Indian Cannabis," C. R. Eckler and F. A. Miller; "Apparent Deterioration of Donovan's Solution," Joseph Rosin.

SECTION ON PRACTICAL PHARMACY AND DISPENSING.

(Pharmacopœias, Formularies and Standards.)

Officers: Chairman, W. H. Glover; Secretary, David Stolz; Associates, Mrs. St. Claire R. Gay and Charles W. Holzhauer, Jr.

In addition to the chairman's address and reports of committees the following papers were read: "Liquors of the U. S. P. and N. F.," Edward Kremers; "Vaccine Therapy in the Light of Facts," A. M. Rovin; "The Tyranny of the Teaspoonful," H. V. Arny; "A Study of Percentage Solutions," T. J. Bradley; Prescription Clinic—E. Fullerton Cook, Ivor Griffith and Charles H. LaWall; "The Carrel-Dakin Solution Pharmaceutically and Physiologically Considered," Mrs. St. Claire Ransford Gay; "The Original Package," L. E. Sayre; "Elixir Iron, Quinine and Strychnine Phosphates," W. H. Glover; (a) "Manna as an Excipient for Soft Mass Pills." (b) "Disintegration of Pills," William Maske, Jr.

SECTION ON COMMERCIAL INTERESTS.

Officers: Chairman, P. Henry Utech; Secretary, Robert P. Fischelis; Associates, A. H. Ackermann, S. K. Sass and J. H. Webster.

Address of Chairman, P. Henry Utech; "Commercial Possibilities in Professional Pharmacy" (Illustrated Lecture), Henry Kraemer; "Drug Store Dynamics," H. S. Noel; "The Commercial Aspect of Vaccine Therapy," A. M. Rovin; "The Preceptor—An Asset or a Liability," F. M. Apple; "A Novel Method of Handling Ice Cream," G. H. Grommet; "Net Profits and the Average Sale," Clyde L. Eddy; "Conserving Life by Eliminating Waste," Robert P. Fischelis; "More Profits Within Your Reach," W. W. Figgis; "Capitalize Your Responsibility," J. C. Peacock.

SECTION ON EDUCATION AND LEGISLATION.

Officers: Chairman, R. A. Kuever; Secretary, C. B. Jordan; Associates, H. V. Arny, Arthur W. Linton and John Culley.

Address of the Chairman, R. A. Kuever; Report of the Secretary, C. B. Jordan; Report of the Committee on Patents and Trade Marks, F. E. Stewart, Chairman; "Pharmacology and the Recognition of Professional Pharmacy by the United States Government," F. E. Stewart; "Military Recognition of the Pharmacist," L. E. Sayre; Report of the Committee on Drug Reform, L. E. Sayre, Chairman; Report of the Committee on National Legislation, John C. Wallace, Chairman; Report of the Committee on Regulation for the Transportations of Drugs by Mail, Benj. L. Murray, Chairman; "Iowa's Prerequisite Law," J. M. Lindly; "The School of Pharmacy and the Profession," C. F. Nelson; "Graduate Pharmaceutical Work," Edward Kremers; "What Compulsory Health Insurance Will Mean to the Druggist," Harry B. Mason; "Some Ideas About the Teaching of Practical Pharmacy," Zada M. Cooper; "Pharmaceutical Journals," Robert P. Fischelis; "Fallacies in Popular Psychology of Salesmanship," Chas. O. Lee; "The U. S. P. IX and N. F. IV as Text Books for Pharmacognosy," W. F. Gidley; A Paper, F. W. Nitardy; "A Bad Spell, or, Who Mixed the Letters," Charles H. LaWall; Report on the Work of the Voluntary Conferences for the Drafting of Modern Laws Pertaining to Pharmacy, Frank H. Freericks, Chairman.

Joint Session of the Section with the American Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy.

Rufus A. Lyman, President American Conference of Pharmaceutical Faculties.

Lawrence C. Lewis, President National Association of Boards of Pharmacy.

Report of the Eighteenth Annual Meeting of the American Conference of Pharmaceutical Faculties, by its Secretary, Wilber J. Teeters; Report of the Fourteenth Annual Meeting of the National Association of Boards of Pharmacy, by its Secretary, H. C. Christensen; Presentation of Resolutions adopted by the A. C. P. F. and N. A. B. P., For Discussion; "The State Legislature," W. H. Cousins; "Are Colleges of Pharmacy Devoting Sufficient Time to Prescription Laboratory Practice?" A. W. Linton; A Paper, Edward Spease; Further Reports and Discussion on the Work of the Voluntary Conference for the Drafting of Modern Laws Pertaining to Pharmacy, Frank H. Freericks, Chairman.

SECTION ON HISTORICAL PHARMACY.

Officers: Chairman, W. L. DuBois; Secretary, L. E. Sayre; Historian, E. G. Eberle.

Address of the Chairman, W. L. DuBois; Report of the Historian, E. G. Eberle; Report on the Indianapolis Historical Exhibit, E. G. Eberhardt; "Eli Lilly, His Relations to Historical Pharmacy in the State of Indiana," J. K. Lilly; "Historical Pharmacy of Indianapolis," Frank H. Carter; "History of American Ginseng," Edward Kremers; "History of New Jersey Pharmaceutical Association (for the Year of 1916)," Edward A. Sayre; "Chicago Veteran Druggists' Association," Wilhelm Bodemann; "Antique Mortars," Caswell A. Mayo; "Observations and Experiences in Pharmacy Extending over Sixty Years," John F. Hancock; "Sketch of Maryland College of Pharmacy Since the Incorporation in 1841," John F. Hancock; "Purdue University School of Pharmacy," W. F. Gidley.

HOUSE OF DELEGATES, A. Ph. A.

Officers: Chairman, J. H. Beal; First Vice-Chairman, S. C. Henry; Second Vice-Chairman, O. F. Claus; Secretary, Jeannot Hostmann.

Sessions: Wednesday, August 29, 4.00 P.M.; Thursday, August 30, 4.00 P.M.

Roll call; Appointment of Committee on Resolutions; Reading of Communications; Chairman's Address, J. H. Beal; Report of Secretary, Jeannot Hostmann; Reports and Resolutions; Miscellaneous Business; Unfinished Business; Report of Committee on Resolutions; Election and Installation of Officers; Adjournment.

WOMENS' SECTION.

Officers: President, Mrs. E. A. Ruddiman; Honorary President, Mrs. John F. Hancock; First Vice-President, Mrs. E. Fine; Second Vice-President, Mrs. G. M. Beringer; Third Vice-President, Mrs. Fletcher Howard; Secretary, Mrs. Jean McKee Kenaston; Treasurer, Mrs. Franklin Apple; Historian, Miss Bertha Ott; Chairman of Executive Committee, Mrs. G. D. Timmons.

Invocation; Chairman's Address, Mrs. E. A. Ruddiman; Appointment of Committees; Report of the Secretary, Mrs. Jean McKee Kenaston; Report of the Treasurer, Mrs. Franklin M. Apple; Reports of Standing Committees; Reports of Special Committees; "Teaching the Public," Miss Zada Cooper; "Chemistry of the Household," Miss Mary Creighton; "Problems in the Druggist's

Home," Mrs. W. B. Philip; "Some Social Service Aspects of the Hospital," Miss Bertha Ott; "How Pharmacists' Wives May be of Service to Their Country," Mrs. David F. Jones; "A Talk," Dr. H. V. Arny.

A glance at these simultaneous activities will convince even the most cursory observer that one of the needs of the association is simplification along lines which will prevent the distractions now strongly reminding one of a three ring circus where one is trying to see everything at once.

It may be that pharmacists, being more versatile, are actively interested in several of these lines of endeavor, but some way should be found so that the conflict of duties and responsibilities does not become so apparent. At one or two periods during the week the interest and success of the general session was jeopardized by the synchronous meetings of sectional or subsidiary organizations.

Besides all the regular scheduled meetings there were pleasure trips for visiting members, a visit to the Lilly laboratories which are models of modern pharmaceutical progress on the large scale, trips to various industrial plants and an evening spent at a play written and produced by local pharmaceutical talent in which the hits were clever and were very much appreciated. Taking it all together, the 65th annual meeting will have an enduring influence upon the progress of pharmacy for the harmony and advancement which were noteworthy features. The meeting for 1918 will be held in Chicago at a time to be selected by the council.

NEW ZEALAND GRAPE INDUSTRY.

According to Consul General Alfred A. Winslow, Auckland, grapes are not very successfully grown in the open in New Zealand since the climate is too moist and cool to allow the fruit to fully mature. There are about 390 acres of vineyards under cultivation, located in the most favorable spots of the Dominion, where limited quantities of middle-quality grapes have been grown, but the grape is not considered a profitable crop. Some most excellent table grapes are grown in this Dominion, but in the vine houses instead of in the open air. There are about 800 of these vine houses in New Zealand, and all seem to be doing a thriving business, especially in the South Island, where practically no grapes are grown in the open. Grapes grown under glass retail here for 36 to 48 cents a pound and always find a ready market.

M. G. S.